



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|----------------------------------|-------------|----------------------|------------------------|------------------|
| 10/562,740 | 06/05/2006 | Donald Borthwick | 2003P07721WOUS | 3839 |
| 22116 | 7590 | 01/10/2008 | EXAMINER | |
| SIEMENS CORPORATION | | | VERDIER, CHRISTOPHER M | |
| INTELLECTUAL PROPERTY DEPARTMENT | | | | |
| 170 WOOD AVENUE SOUTH | | | ART UNIT | PAPER NUMBER |
| ISELIN, NJ 08830 | | | 3745 | |
| | | | MAIL DATE | DELIVERY MODE |
| | | | 01/10/2008 | PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | |
|------------------------------|------------------------|---------------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 10/562,740 | BORTHWICK ET AL. |
| | Examiner | Art Unit |
| | Christopher Verdier | 3745 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 05 June 2006.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 21-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 21-40 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 09 January 2006 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>1-9-06</u> . | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| | 6) <input type="checkbox"/> Other: _____ |

Receipt and entry of Applicant's Preliminary Amendment and Substitute Specification dated January 9, 2006 is acknowledged.

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: 45, 46, 56, and 57. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

Claims 23 and 32-40 are objected to because of the following informalities: Appropriate correction is required.

In claim 23, line 2, "transition" should be changed to -- transitions --.

In claim 32, last line, "a" should be changed to -- the --.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 21-40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 21, line 2, "the turbine" lacks antecedent basis. Claim 21, the last two lines, which refer to the rotor-side and stator-side ends having a negative sweep angle measured between the instantaneous tangent of the blade surface and the fluid flow direction, are unclear. It is unclear if Applicant is attempting to claim that the rotor-side and stator-side ends have a negative sweep angle measured between the instantaneous tangent of the blade surface at the rotor-side end and the stator-side end, respectively, and the fluid flow direction, or not. In claim 32, line 2, "the turbine" lacks antecedent basis. In claim 32, line 6, "the leading edge" lacks antecedent basis. Claims 35 and 36, which refer to the rotor-side end being inclined at specific angles, are unclear if this inclination is relative to the fluid flow direction, or relative to the delivery side inclination.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 21-29, as far as they are definite and understood, are rejected under 35 U.S.C. 102(b) as being anticipated by Lings 4,504,189. Disclosed is a turbine blade 16, comprising a stator-side end near 18 located toward an unnumbered stationary stator cylinder of the turbine, a rotor-side end near 17 located toward an axial rotor 15 of the turbine, an unnumbered leading edge located between the stator-side end and the rotor-side end, and a trailing edge 24 located between the stator-side end and the rotor-side end and located downstream of the leading edge with respect to a fluid flow direction, wherein the rotor-side and stator-side ends have a negative sweep angle as measured between the instantaneous tangent of the blade surface and the fluid flow direction. Negative sweep results in the direction of flow being rotated in a mathematically negative direction in order to achieve a coincidence of the direction of flow with respect to the instantaneous tangent of the blade surface. The negative sweep angle of the rotor-side and stator-side ends transition into a positive sweep in a region between the leading edge and trailing edge, near line 3-3. The rotor-side end negative sweep is about 68 degrees. The stator-side end negative sweep is about 50 degrees. The turbine blade is a stationary guide blade. The leading edge is arranged in front of the trailing edge in the axial direction of flow at the stator-side end and the rotor-side end. The turbine blade is arranged in a turbomachine.

Claims 21-22, 24, 26-29, 32-33, 35, and 37-38, as far as they are definite and understood, are rejected under 35 U.S.C. 102(b) as being anticipated by Liu 2002/0141863 (figures 1-5). Disclosed is a turbine blade 30, comprising a stator-side end near 46 located toward a stationary

stator cylinder 28 of the turbine, a rotor-side end near 44 located toward an axial rotor 20/22/32 of the turbine, a leading edge 40 located between the stator-side end and the rotor-side end, and a trailing edge 42 located between the stator-side end and the rotor-side end and located downstream of the leading edge with respect to a fluid flow direction 24, wherein the rotor-side and stator-side ends have a negative sweep angle as measured between the instantaneous tangent of the blade surface and the fluid flow direction. Negative sweep results in the direction of flow being rotated in a mathematically negative direction in order to achieve a coincidence of the direction of flow with respect to the instantaneous tangent of the blade surface. The rotor-side end negative sweep is about 88 degrees. The stator-side end negative sweep is about 88 degrees. The turbine blade is a stationary guide blade. The leading edge is arranged in front of the trailing edge in the axial direction of flow at the stator-side end and the rotor-side end. The turbine blade is arranged in a turbomachine. A delivery side 36 is located between the stator-side end and the rotor-side end, and a suction side 38 is located between the stator-side end and the rotor-side end and located down-stream of the leading edge with respect to the fluid flow direction, wherein the rotor-side end is inclined toward the delivery side and the stator-side end is inclined with respect to the fluid flow direction. The stator side end is inclined at an angle of about 88 degrees. The rotor-side end is inclined with respect to the fluid flow direction at an angle of about 88 degrees. The rotor-side end is inclined at about a 65 degree angle between the stacking axis 50 and a tangent to the rotor side inner as seen in figure 3. Blade 30 is considered to be a turbine blade since it is located in a gas turbine engine.

Claims 21-22, 24, and 26-31, as far as they are definite and understood, are rejected under 35 U.S.C. 102(b) as being anticipated by Bessay 4,500,256 (figure 1). Disclosed is a turbine blade (stationary blades 1 or the unnumbered rotating blades attached to rotor 3), comprising a stator-side end near 4 located toward a stationary stator cylinder 4 of the turbine, a rotor-side end near 3 located toward an axial rotor 3 of the turbine, a leading edge (to the left) located between the stator-side end and the rotor-side end, and a trailing edge (to the right) located between the stator-side end and the rotor-side end and located down-stream of the leading edge with respect to a fluid flow direction shown by the arrow, wherein the rotor-side and stator-side ends have a negative sweep angle as measured between the instantaneous tangent of the blade surface and the fluid flow direction. Negative sweep results in the direction of flow being rotated in a mathematically negative direction in order to achieve a coincidence of the direction of flow with respect to the instantaneous tangent of the blade surface. The rotor-side end negative sweep for a stator blade is about 85 degrees. The stator-side end negative sweep for a stator blade is about 85 degrees. The turbine blade is a stationary guide blade or a rotating blade. The leading edge is arranged in front of the trailing edge in the axial direction of flow at the stator-side end and the rotor-side end. The turbine blade is arranged in a turbomachine. A second up-stream turbine guide blade is located at a constant axial distance from a rotating turbine blade. A trailing edge of the second up-stream guide blade is located at a constant axial distance from the leading edge of the rotating blade at the rotor-side end.

Claims 21-22, 24, 26-31, 32-33, 35, and 37-40 as far as they are definite and understood, are rejected under 35 U.S.C. 102(b) as being anticipated by Sato 5,249,922 (figures 1-3, 8-9, and

10b-10c). Disclosed is a turbine blade 1 or 2, comprising a stator-side end near 5 located toward a stationary stator cylinder 5 of the turbine, a rotor-side end near D located toward an axial rotor 2 of the turbine, a leading edge 1a located between the stator-side end and the rotor-side end, and a trailing edge 1b located between the stator-side end and the rotor-side end and located down-stream of the leading edge with respect to a fluid flow direction, wherein the rotor-side and stator-side ends have a negative sweep angle as measured between the instantaneous tangent of the blade surface and the fluid flow direction. Negative sweep results in the direction of flow being rotated in a mathematically negative direction in order to achieve a coincidence of the direction of flow with respect to the instantaneous tangent of the blade surface. The rotor-side end negative sweep for a stator blade is about 85 degrees. The stator-side end negative sweep for a stator blade is about 85 degrees. The turbine blade is a stationary guide blade 1 or a rotating blade 2. The leading edge is arranged in front of the trailing edge in the axial direction of flow at the stator-side end and the rotor-side end. The turbine blade is arranged in a turbomachine. Concerning claims 30-31 and 39-40, in figures 8-9 and 10b-10c, a second up-stream turbine guide blade 1 is located at a constant axial distance from a rotating turbine blade 2. A trailing edge of the second up-stream guide blade is located at a constant axial distance from the leading edge of the rotating blade at the rotor-side end. A concave delivery side (see figures 1-3) of blade 1 is located between the stator-side end and the rotor-side end, and a convex suction side of blade 1 is located between the stator-side end and the rotor-side end and located down-stream of the leading edge with respect to the fluid flow direction, wherein the rotor-side end is inclined toward the delivery side and the stator-side end is inclined with respect to the fluid flow direction. The stator side end is inclined at an angle of about 85 degrees. The rotor-side end is

inclined with respect to the fluid flow direction at an angle of about 85 degrees. The rotor-side end is inclined at about a 65 degree angle between the leading edge and a tangent to the rotor side inner as seen in figure 2 (formed between the rightmost line of angle γ_{Ri} and the tangent to the rotor side inner).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 34, as far as it is definite and understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato 5,249,922. Sato (figures 1-3) disclose a turbine blade 1 substantially as claimed as set forth above, including the stator-side end inclined at an angle of about 85 degrees, but does not disclose that the angle of inclination is 70 degrees.

The recitation of the angle of inclination of the stator-side end relative to the fluid flow direction being 70 degrees is a matter of choice in design. The angle of inclination of the stator-side end relative to the fluid flow direction of a turbine blade is a result-effective variable which influences the turbine efficiency and performance. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to select the angle of inclination of the stator-side end relative to the fluid flow direction in the turbine of Sato to be a specific value, such as 70 degrees, for the purpose of optimizing the turbine efficiency and performance, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claim 36, as far as it is definite and understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over either Liu 2002/0141863 or Sato 5,249,922. Liu (figures 1-5) or Sato (figures 1-3) disclose turbine blades 30/1 substantially as claimed as set forth above: In Liu, the rotor-side end is inclined with respect to the fluid flow direction at an angle of about 88 degrees, and the rotor-side end is inclined at about a 65 degree angle between the stacking axis 50 and a tangent to the rotor side inner as seen in figure 3. In Sato, the rotor-side end is inclined with respect to the fluid flow direction at an angle of about 85 degrees. The rotor-side end is inclined at about a 65 degree angle between the leading edge and a tangent to the rotor side inner as seen in figure 2.

However, Liu or Sato do not disclose that the angle of inclination is 75 degrees.

The recitation of the angle of inclination of the rotor-side end is a matter of choice in design. The angle of inclination of the rotor-side end relative to the fluid flow direction of a turbine blade, and/or the angle of inclination of the rotor-side end relative to the delivery side of a turbine blade are result-effective variables which influence the turbine efficiency and performance. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to select the angle of inclination of the rotor-side end relative to the fluid flow direction and/or the angle of inclination of the rotor-side end relative to the delivery side of the turbine blade in the turbine of Liu or Sato to be a specific value, such as 75 degrees, for the purpose of optimizing the turbine efficiency and performance, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Prior Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Reluzco (figure 8) is cited to show a turbine blade with a negative sweep angle at the leading edge. This reference could also have been applied as it anticipates at least claim 21 under 35 U.S.C. 102, but is not applied at this time in order to avoid multiple rejections.

Ito is cited to show a turbine blade and a turbine vane with a negative sweep angle at the leading edge. This reference could also have been applied as it anticipates at least claim 21 under 35 U.S.C. 102, but is not applied at this time in order to avoid multiple rejections.

Rowland is cited to show a turbine blade having negative sweep angles at a root and a tip, and a positive sweep angle at a mid portion, and curved toward the delivery side at the root. This reference could also have been applied as it anticipates at least claim 21 under 35 U.S.C. 102, but is not applied at this time in order to avoid multiple rejections.

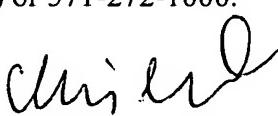
Wood is cited to show a turbine blade that is inclined toward the delivery side at a rotor-side end. This reference could also have been applied as it anticipate at least claim 32 under 35 U.S.C. 102, but is not applied at this time in order to avoid multiple rejections.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher Verdier whose telephone number is (571) 272-4824. The examiner can normally be reached on Monday-Friday from 10:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward K. Look can be reached on (571) 272-4820. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

C.V.
December 31, 2007


Christopher Verdier
Primary Examiner
Art Unit 3745